

## Passive Wireless SAW Humidity Sensors, Phase I

Completed Technology Project (2008 - 2009)



## Project Introduction

This proposal describes the preliminary development of passive wireless surface acoustic wave (SAW) based humidity sensors for NASA application to distributed humidity monitoring systems. SAW devices are a platform technology for passive wireless sensing of numerous possible measurands. SAW devices have been demonstrated as passive wireless temperature sensors in NASA contracts NNK04OA28C and NNK05OB31C, and as hydrogen sensors and cryogenic liquid level sensors under contracts NNK06OM24C and NNK06OM23C. ASR&D is currently developing these sensors and systems further under NASA Phase II STTR contracts NNK07EA38C and NNK07EA39C. The proposed humidity sensors will use individually coded SAW device structures combined with hygroscopic film elements to produce rapid, sensitive humidity sensors capable of wireless operation over the full range of relative humidity (0% to 100%). The Phase I research will utilize the results obtained in ASR&D's coded SAW sensor and wireless interrogation system research, and external research on SAW-based and nanofilm based humidity sensing techniques. The team will evaluate hygroscopic films previously investigated and novel nanostructured films, along with sensor device simulation, to determine which films are most likely to produce devices with desirable characteristics. Issues including formation of chemically selective films on piezoelectric substrates, optimization of this film, and the effects of environmental factors on device performance will be investigated. Successful completion of the proposed Phase I activities will establish the technical feasibility of producing the proposed humidity sensors, evaluate their potential performance capabilities in a range of operational environments, and define the additional work necessary to effect device implementation. Assuming the results of Phase I are positive, Phase II could result in the development of multiple uniquely identifiable, wirelessly interrogable, humidity sensors.



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Kennedy Space Center (KSC)

**Responsible Program:**

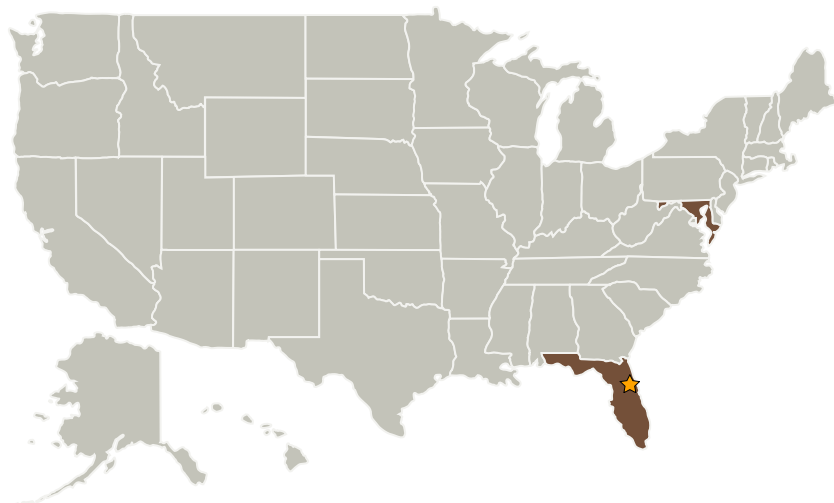
Small Business Innovation Research/Small Business Tech Transfer

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
SenSanna Incorporated (formerly Applied Sensor Research & Development)	Supporting Organization	Industry Women-Owned Small Business (WOSB), Veteran-Owned Small Business (VOSB)	Arnold, Maryland

## Primary U.S. Work Locations

Florida	Maryland
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Leland Solie

## Technology Areas

**Primary:**

- TX13 Ground, Test, and Surface Systems
  - └ TX13.2 Test and Qualification
    - └ TX13.2.7 Test Instruments and Sensors